Lab3

Production of lactic acid

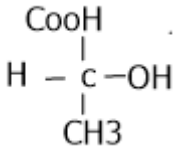
It is an organic acid produced from microorganisms and also produced from the oily products and consider as a resultant of the primary metabolism of the microorganisms.

The structure of the lactic acid: CH_3CH oH CooH

Lactic acid is presented in three forms as it contains anon-asymmetric carbon atom.

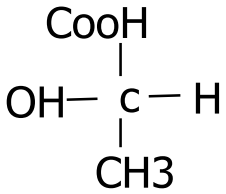
The forms of lactic acid

1- Dextrorotatory



D (+) Lactic acid

2- Levorotatory



L (-) Lactic acid

3- Racemic

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1- Biological production:

More than 90% of the lactic acid is produced by using the bacteria and yeasts, produced from it the form L or D, and is used in industry and we can increase the production by choosing the type of mutant bacteria or genetic engenier.

2- **Oil production:**

Produced racemic form, not used in industry, inert and produced by using the lactic acid material lactic_nitroil.

- The media used in lactic acid production:

1- Potata and corn starch medium.

2- Molasses medium.
3- The waste product of sulphit paper production.
4- Whey medium.
5- The agricultural wast products.

Application of lactic acid

1- Food industries (cheese, jelly, jam, canned food and soda drinks).
2- Detergent industried, gums, leather tanning, and plastic industries.
3- Pharmaceutical, cosmetic and medical applications.
4- Used for ca-deficiency treatment.
5- Salts of lactic acid (ca-lactate), as additives in animal feed, (cu-lactate) is used for electrical paints.

Microorganism of lactic acid includes:

1-Homofermentative lactobacilli:

Produced lactic acid mainly and alittle amount of secondary product by (EMP) Embden-Meyerhof-Parnas pathway. Geneuse lactobacillus important in industrial and the important specieses are ***lactobacillus delbrueckii*** and ***lactobacillus bulgariacus, L.pentosus*** and ***Lactococcus Lactis, L. cremoris***.

The media, which is used in this fermentation, is whey.

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2- Hetero fermentaive lactobacill:

A little amount of lactic acid produced and secondary product are acetic acid, ethanol, CO_2, this not important in industry.

The important bacteria used ***Leuconostoc mesentroides***,

Production of starter:

In culate (whey, skim, milk) with ***streptococcus thermophilus***, ***lactobacillus bulgaricus.***

Incubated at (42-45) °C. In first hour grow ***streptococcus thermophilus*** then the PH became (6.6-5.8), this aid the growth of ***lactobacillus bulgaricus*** the PH (4.8), then consist stable clot. At PH (4) cool the product because not consist whey.

Characteristucs of a good starter:

1- It should be consist of lactic acid (0.7 -0.9%)
2- It should be without whey.
3- Not contaminated with yeasts, fungi or bacteria like ***E. coli*** and bacillus sp.
4- Firm consistency and has acidic tasts.

Procedurs:

1- Estimation of total percent acidity of lactic acid:

total acidity 10ML sample of dairy and add to 3 drops of phenonaphthalen, titration with NaoH 0.1 N until pule pink color is appeared and using the laws.

$$\%TA \text{ (total acidity)} = \frac{\text{volume of NaoHx N. of NaoH (0.1) X Eq.w of latic acid}}{\text{sample volume}}$$

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2- Detection of lactic acid

A- 2ml sample of dairy+2ml phenol 0.8%+5 drops of fec13 result of positive (blue color) then convert to pale yellow color

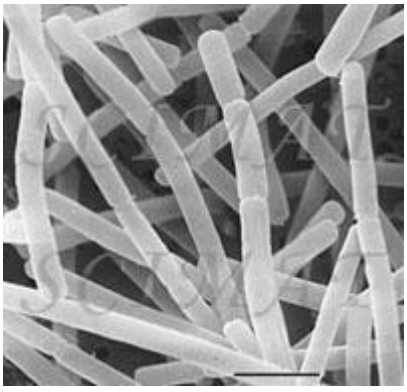
B- α. nitroso -B –naphthol reagent:

2ml sample of dairy add α. nitroso -B- naphthol reagent)

Then observed green color as appositive result

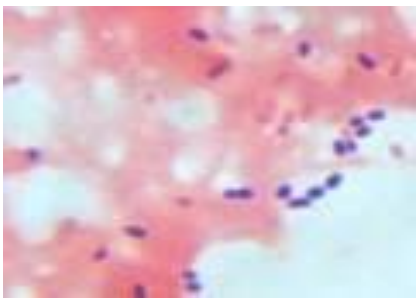
Isolation and purification of lactic acid

Add calcium carbonate to adjustment pH at (pH=10) and convert to calcium lactate then filtration and heated until take crystalize shap. Add H_2SO_4 to remove calcium and convert to calcium sulphate and final observe lactic acid as crystals.



(2) Lactobacillus deldrueckii

(3) Leuconostoc mesenteroides



(4) Streptococcus lactis